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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/084,810      | 02/25/2002  | Wen-Chun Liu         | JCLA4426-D          | 8634             |

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06/04/2003

EXAMINER

NGUYEN, DILINH P

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2814

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/084,810

Applicant(s)

LIU ET AL.

Examiner

DiLinh Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 15-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15 and 18-26 is/are rejected.
- 7) ☒ Claim(s) 16 and 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_. 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

The disclosure is objected to because of the following informalities: in page 11, line 17, the phrase: "...external metal pegs 224..." is not understood.

In page 12, line 3, the phrase: "...external metal peg 224..."; line 4, the phrase: "...external metal peg 228..." and line 6, the phrase: "...external metal peg 224..." are not understood.

Reference characters 224 and 228 both have been used to designate external metal peg.

Appropriate correction is required.

### ***Claim Objections***

Claim 15 is objected to because of the following informalities:

In page 17, line 17, the phrase: "...from a plurality of second metal pegs..." should be changed to form a plurality of second metal pegs.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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2. Claims 15 and 18-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (figs. 1a-1e) in view of Tsuji et al. (U.S. Pat. 5656550) and further in view of Cox et al. (U.S. Pat. 5807610).

AAPA (figs. 1a-1b) disclose method form forming an IC package comprising the steps of:

providing a metal substrate 100 that has a first surface 102a and a second surface 102b;

forming a mask layer over the first surface to form a die pad region so that the first electrode layers 110 are positioned around the die pad region;

etching the exposed metal substrate on the first surface using the mask layer as an etching mask to form a die pad; and

removing the mask layer.

AAPA (figs. 1a-1e) fail to disclose the method for forming the IC package that contains an array of second metal pegs and plurality of printed circuit lines.

Tsuji et al. disclose a semiconductor device (figs. 20a-21c, column 16, lines 26 et seq.) comprising:

providing a metal substrate 61 that has a first surface and a second surface;

forming a plurality of first electroplate layers 62 on the first surface and forming a plurality of second electroplate layers 63 on the second surfaces;

form a die pad region so that the first electroplate layers are positioned around the die pad region;

etching the exposed metal substrate on the first surface using the first electroplate layers as an etching mask to form a plurality of first metal pegs 28a;

attaching a die 41 (fig. 21a) over the die pad, and connecting the die and the first electroplate layers electrically, wherein each area of the metal peg under the die pad region is smaller than the area of the die;

enclosing the die, the die pad, the first electroplate layers and the first metal pegs above the first surface of the metal substrate with an insulating material 23;

etching the exposed metal substrate on the second surface using the second electroplate layers as an etching mask to form a plurality of second metal pegs and a plurality of connection regions 66 between the second metal pegs (fig. 21a).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of AAPA to improve a reliability and electrical characteristics for the semiconductor package, as shown by Tsuji et al.

However, AAPA and Tsuji et al. fail to disclose forming a plurality of circuit line masks on the surface of the metal substrate.

Cox et al. disclose a semiconductor device comprising: a mask layer 10 over a surface of a substrate 11 having a printing pattern (figs. 1-2, column 5, lines 30 et seq. and abstract). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of AAPA and Tsuji et al. to provide a mask layer over the surface of the substrate, as shown by Cox et al. to reduce the damage for the surface of the metal pattern and increase the degree of attachment for the device.

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- Regarding claims 18-19, it would have been obvious to form the electroplate layers includes electroplating a material chosen from a group consisting of gold, silver, nickel, palladium and a combination of them.
- Regarding claim 20, AAPA (figs. 1a-1e) disclose forming a photoresist layer 104a over the first surface of the metal substrate 100; and exposing the phototresist layer and developing the photoresist layer to form the mask layer.
- Regarding claims 21-23, it would have been obvious to form a plurality of sidewall masks on the sidewalls of the circuit lines and wherein the circuit line masks includes using a screen printing method.
- Regarding claims 24-25, Tsuji et al. disclose forming a plurality of solder ball 71 for the device.
- Regarding claim 26, it would have been obvious to smear solder paste over the surface of each second electroplate layer.

#### ***Allowable Subject Matter***

Claims 16-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Conclusion***

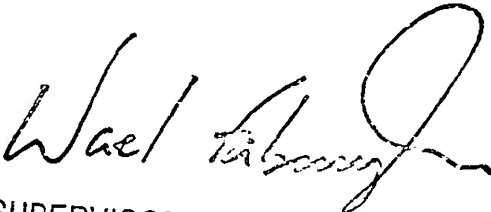
Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (703) 305-6983. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DLN  
May 30, 2003

  
SUPERVISORY PRIMARY EXAMINER  
TECHNOLOGY CENTER 2800